

WHAT IS CLAIMED IS:

1 1. A method of operating an electronic apparatus to control vocalizing by a dog, the
2 electronic apparatus including

3 i. a housing supported against the animal's skin by a strap,

4 ii. first and second stimulus electrodes connected to a surface of the housing,

5 iii. a sensor supported by the housing for producing signals in response to
6 vocalizing by the dog,

7
8 iv. control circuitry, including a controller, in the housing having an input
9 coupled to an output of the sensor, the control circuitry including output terminals coupled to
10 produce aversive stimulus signals between the first and second stimulus electrodes in response to
11 vocalizing by the dog;

12 the method comprising:

13 (a) electronically converting vocalizing sounds from the dog into a sequence
14 of corresponding signals representing the frequencies of the vocalizing sounds, and providing the
15 sequence of signals as an input to the controller;

16 (b) operating the controller to determine the frequencies of the sequence of
17 signals during a predetermined interval of time;

18 (c) operating the controller to determine if each measured frequency lies
19 within any of a plurality of predetermined frequency sub-ranges and if so, then incrementing
20 cumulative totals of the frequencies which lie in the sub-ranges, respectively, to provide a
21 plurality of cumulative totals that represent a frequency spectrum of the vocalizing sounds;

22 (d) determining whether the barking sounds constitute a valid bark by
23 operating the controller to compare the frequency spectrum to a predetermined valid bark
24 frequency spectrum; and

25 (e) operating the microcontroller to cause the control circuitry to cause
26 appropriate aversive stimulus signals to be produced between the first and second stimulus
27 electrodes if the determination of step (d) determines that the vocalizing sounds constitute a valid
28 bark.

1 2. A method of operating a collar-mounted electronic apparatus to control barking by
2 a dog, the electronic apparatus including

- i. a housing supported by a collar for attachment to the dog's neck,
- ii. first and second stimulus electrodes connected to a surface of the housing,
- iii. a sensor supported by the housing for detecting vibrations caused by vocalizing and/or barking by the dog,
- iv. control circuitry, including a microcontroller, in the housing having an input coupled to an output of the sensor, the control circuitry including output terminals coupled to produce aversive stimulus signals between the first and second stimulus electrodes in response to barking by the dog;

the method comprising:

- (a) providing a range of frequencies within which valid barking sounds fall and a plurality of sub-ranges within the range;
- (b) electronically converting barking sounds from the dog into a sequence of corresponding signals representing the frequencies of the barking sounds, and providing the sequence of signals as an input to the microcontroller;
- (c) operating the microcontroller to determine the frequencies of the sequence

19 of signals during a predetermined interval of time;

20 (d) operating the microcontroller to determine if each measured frequency lies
21 within any of the sub-ranges and if so, then incrementing a cumulative total of the frequencies
22 which lie in that sub-range to provide a plurality of cumulative totals that represent a frequency
23 spectrum of the barking sounds;

24 (e) determining whether the vocalizing sounds constitute a valid bark by
25 operating the microcontroller to compare the frequency spectrum to a predetermined valid bark
26 frequency spectrum; and

27 (f) operating the microcontroller to cause the control circuitry to cause
28 appropriate aversive stimulus signals to be produced between the first and second stimulus
29 electrodes if the determination of step (e) determines that the barking sounds constitute a valid
30 bark.

1 3. The method of claim 2 wherein the range of frequencies is from 150 hertz to 800
2 Hz.

1 4. The method of claim 3 wherein the number of sub-ranges is 16.

1 5. The method of claim 2 wherein the sub-ranges are contiguous across the range.

1 6. The method of claim 2 wherein the predetermined interval of time is
2 approximately 120 milliseconds.

1 7. An electronic apparatus for controlling vocalizing by a dog, the electronic
2 apparatus including:

3 (a) a housing supported against the animal's skin;

4 (b) first and second stimulus electrodes connected to a surface of the housing;

5 (c) a sensor supported by the housing for producing signals in response to
6 vocalizing by the dog;

7 (d) control circuitry, including a controller, in the housing having an input
8 coupled to an output of the sensor, the control circuitry including output terminals coupled to
9 produce aversive stimulus signals between the first and second stimulus electrodes in response to
10 vocalizing by the dog;

11 (e) the control circuitry electronically converting vocalizing sounds from the
12 dog into a sequence of corresponding signals representing the frequencies of the vocalizing
13 sounds, and providing the sequence of signals as an input to the controller;

14 (f) the controller executing a stored program to determine the frequencies of
15 the sequence of signals during a predetermined interval of time;

16 (g) the controller executing the stored program to determine if each measured
17 frequency lies within any of a plurality of predetermined frequency sub-ranges and if so, then
18 incrementing cumulative totals of the frequencies which lie in the sub-ranges, respectively, to
19 provide a plurality of cumulative totals that represent a frequency spectrum of the vocalizing
20 sounds;

21 (d) the controller executing the stored program to determine whether the
22 barking sounds constitute a valid bark by operating the controller to compare the frequency
23 spectrum to a predetermined valid bark frequency spectrum; and

24 (e) the controller executing the stored program to cause the control circuitry to
25 produce appropriate aversive stimulus signals between the first and second stimulus electrodes if
26 the vocalizing sounds constitute a valid bark.

1 8. The electronic apparatus of claim 7 wherein the range of frequencies is from 150
2 hertz to 800 Hz.

1 9. The electronic apparatus of claim 7 wherein the number of sub-ranges is 16.

1 10. The electronic apparatus of claim 7 wherein the sub-ranges are contiguous across
2 the range.

1 11. The electronic apparatus of claim 7 wherein the predetermined interval of time is
2 approximately 120 milliseconds.

1 12. An electronic apparatus for controlling vocalizing by a dog:

2 (a) a housing supported against the animal's skin by a strap;

3 (b) first and second stimulus electrodes connected to a surface of the housing;

4 (c) a sensor supported by the housing for producing signals in response to vocalizing
5 by the dog;

6
7 (d) control circuitry, including a controller, in the housing having an input coupled to
8 an output of the sensor, the control circuitry including output terminals coupled to produce
9 aversive stimulus signals between the first and second stimulus electrodes in response to
10 vocalizing by the dog;

11 (e) means for electronically converting vocalizing sounds from the dog into a
12 sequence of corresponding signals representing the frequencies of the vocalizing sounds and
13 providing the sequence of signals as an input to the controller;

14 (f) means for operating the controller to determine the frequencies of the
15 sequence of signals during a predetermined interval of time;

16 (g) means for operating the controller to determine if each measured
17 frequency lies within any of a plurality of predetermined frequency sub-ranges and if so, then
18 incrementing cumulative totals of the frequencies which lie in the sub-ranges, respectively, to
19 provide a plurality of cumulative totals that represent a frequency spectrum of the vocalizing
20 sounds;

21 (h) means for comparing the frequency spectrum to a predetermined valid
22 bark frequency spectrum to determine whether the barking sounds constitute a valid bark by
23 operating the controller to; and

24 (i) means for operating the microcontroller to cause the control circuitry to
25 cause appropriate aversive stimulus signals to be produced between the first and second stimulus
26 electrodes if the determination of step (d) determines that the vocalizing sounds constitute a valid
27 bark.